

QUALITY CONTROL AND INDEPENDENT TECHNICAL REVIEW PLAN

Four Mile Run Watershed

City of Alexandria and Arlington County, Virginia

General Investigation – Feasibility Study

June 2007

QUALITY CONTROL AND INDEPENDENT TECHNICAL REVIEW PLAN

1.0 PURPOSE

This plan presents the process that assures quality products for the Four Mile Run Watershed Study, a General Investigation (GI) feasibility study. This quality control (QC) and independent technical review (ITR) plan, herein referenced as the “review plan,” defines the responsibilities and roles of each member assigned to the study and the technical review team.

The product to be reviewed by the technical review team is the integrated feasibility report, meaning that all required National Environmental Policy Act (NEPA) documentation is included. Under the provisions of the U.S. Army Corps of Engineers (USACE) policy regarding peer review as detailed in Engineering Circular (EC) 1105-2-408 dated May 31, 2005, the ITR will be conducted by specialists from organizations outside of the Baltimore District, which is currently responsible for the study. Independent technical review will be conducted on all decision documents and will be separate from the technical production of the project. This plan is an addendum to, and is by reference, a part of the project management plan which scopes the effort for this feasibility study.

2.0 APPLICABILITY

This document provides the quality control review plan for the feasibility study. It identifies the quality control processes and independent technical review for all work to be conducted under this study authority, including in-house, sponsor and contract work.

3.0 REFERENCES

EC 1105-2-407 “Planning Models Improvement Program: Model Certification” (May 31, 2005)
EC 1105-2-408 “Peer Review of Decision Documents” (May 31, 2005)
EC 1105-2-409 “Planning in a Collaborative Environment” (May 31, 2005)
ER 1105-2-100 “Planning Guidance Notebook & Appendices”

4.0 GENERAL PROJECT DESCRIPTION

The study area is defined as the Four Mile Run watershed in Northern Virginia. The total drainage area of the watershed is approximately 19.1 square miles and includes portions of four local jurisdictions:

- 3.2 square miles are within the City of Alexandria,
- 0.6 square miles in the City of Falls Church,
- 13.2 square miles in Arlington County, and
- 2.1 square miles in Fairfax County.

The study area contains 183,000 residents in the greater Washington metropolitan area. The region is completely urbanized with an impervious cover of over 40 percent. Urbanization has

led to major impacts in the watershed, such as excessive nutrients, sedimentation, loss of habitat, flooding and impair water quality

A study of Four Mile Run, Virginia, was specifically authorized by Section 201 of the Flood Control Act of 1965 (Public Law 89-298), as modified by the River Basin Monetary Authorization Act of 1971 and Section 84 of Water Resources Development Act of 1974 (Public Law 93-251) which states:

"The Secretary of the Army, acting through the Chief of Engineers, is authorized to construct, operate, and maintain any purpose projects involving, but not limited to, navigation, flood control, and shore protection, if the estimated Federal first cost of constructing such project is less than \$10,000,000."

In March of 1974, Congress authorized the Corps to design and construct a project for flood protection on Four Mile Run "to accommodate flood flows of twenty-seven thousand cubic feet per second" (Public Law 93-251, Section 84). The Four Mile Run local flood protection project (LFPP) was designed to provide protection from flood flows on Four Mile Run, and both fluvial and tidal backwater stages from the Potomac River. Construction of the LFPP was completed in 1980.

More recent authority for the study was given in the Energy and Water Appropriations Bill of 2002, which provided \$100,000 "*for the Corps of Engineers to undertake a reconnaissance study of flood control needs and environmental restoration opportunities in Four Mile Run, Virginia.*" Under the 2002 authority, the first action by the Corps was to complete a reconnaissance study for the entire watershed. The Four Mile Run 905(b) (WRDA 86) Analysis report, dated August 2002, recommended that the Corps of Engineers conduct a feasibility study for environmental restoration of the Four Mile Run watershed. The feasibility cost-sharing agreement for this study was executed in September 2004.

In addition to authorizing the local flood protection project on Four Mile Run in 1974, Congress also mandated a multi-jurisdictional land use management program. This mandate led to the creation of the Four Mile Run Watershed Management Program at the Northern Virginia Regional Commission (NVRC). Represented by the various counties and cities within the watershed, this commission was tasked with developing a method for quantifying the benefits of reducing flood damages by reducing the amount of stormwater runoff. The NVRC has developed a watershed model for stormwater management purposes. In addition to the model, a variety of studies and products related to improving water quality and restoring flood damages have been underway, such as: a regional best management practices study, non-point source planning and outreach, and TMDL (total maximum daily load) studies and implementation plan.

During the planning process for the South Tract development adjacent to Four Mile Run, Arlington County and the City of Alexandria applied for and received a grant from the Environmental Protection Agency in the amount of \$1,000,000 in 2002 to evaluate environmental opportunities within the levee corridor and construct an environmental demonstration project.

Coordination for the project as well as other watershed activities is focused in the Four Mile Run Agency Coordination Group. It is comprised of representatives from USACE's Baltimore District, the project's two non-federal sponsors (Arlington County and the City of Alexandria), the Northern Virginia Regional Commission, as well as representatives from the Joint Task Force. The Baltimore District project team includes representatives from Planning, Engineering, Real Estate, Construction, Contracting, and Program and Project Management Divisions, as well as the Office of Counsel and the Resource Management Office. The non-federal sponsor is comprised of local jurisdiction representatives from the following entities:

Alexandria

- Alexandria Park and Recreation Commission
- Department of Transportation and Environmental Services
- Department of Planning and Zoning
- Department of Recreation, Parks and Cultural Activities

Arlington

- Arlington Planning Commission
- Arlington County Park and Recreation Commission
- Department of Environmental Services
- Department of Parks, Recreation and Community Resources
- Department of Public Works
- Department of Community Planning and Development

5.0 REVIEW REQUIREMENTS

Initial quality control (QC) review will be handled within the Corps section or branch office performing the work or by staff in the corresponding sponsor jurisdiction when the work involves in-kind services. Additional QC will be performed by the project team during the course of completing the integrated feasibility study. The detailed checks of computations and methodology should be performed at the District level, and the processes for this level of review are well established.

Pursuant to EC 1105-2-408, item 2c(2), any models used in the preparation of decision documents covered by that circular will be reviewed in accordance with EC 1105-2-407, *Planning Models Improvement Program: Model Certification*, and are not subject to the requirements of the [1105-2-408] circular. The uses and applications of models in individual studies that lead to the preparation of decision documents will be reviewed in accordance with its requirements by the related discipline(s) as part of this technical review.

Pursuant to EC 1105-2-408, because this study leads to a decision document requiring authorization by Congress, as well as recent guidance, an ITR team will be assigned by the Planning Center of Expertise (PCX) for Environmental Restoration (National Ecosystem Planning) projects. Dr. Dave Vigh (CEMVD-RB-T) of the appointed PCX will assign this team. It is recommended that an ITR, handled entirely within USACE, will satisfy the peer review requirements, as the risk and magnitude of the proposed project do not warrant an additional external peer review (EPR) based upon the initial risk screening process conducted by the project study manager, as noted in section 9. It is anticipated that while this study will be challenging and beneficial, it will not be novel, controversial or precedent-setting, nor will it have significant national importance. As a result, the ITR will focus on:

- Review of the planning process and criteria applied,
- Review of the methods of preliminary analysis and design,
- Compliance with project authority and NEPA requirements
- Completeness of preliminary design and support documents, and
- Assessment of interdisciplinary coordination.

Following initiation of the study in 2004, Baltimore District began discussions with the New England District regarding their involvement as the ITR for this project. Final approval of the assigned ITR will come from the PCX now that recent guidance dictates this as their responsibility.

6.0 REVIEW PROCESS

It is anticipated that the ITR process will begin after the ITR team has been assigned, and will initially review the project management plan and the models to be used in the preliminary analysis. As alternative plans are formulated, the review process will focus on data, assumptions, and the engineering, scientific, economic, social and environmental analysis.

The major milestones of the review process are listed below, with all North Atlantic Division (NAD) required meetings indicated by a “P”:

- Approval of review plan by NAD
- ITR team assigned by PCX
- P-6 read-ahead materials (RAM) to ITR
- P-6 feasibility scoping meeting
- P-7 RAM (formulation analysis notebook) to ITR
- P-7 plan formulation meeting
- P-8 RAM for alternative formulation briefing
- Alternative formulation briefing
- Draft report review
- Final report review

7.0 REVIEW COST

The cost of the ITR will be negotiated between the Baltimore District and the PCX. It is assumed that documents to be reviewed will be transmitted electronically to the assigned ITR members. Comments will be recorded using DrChecks software if technical in nature; otherwise another suitable format will be coordinated with the ITR member. All comments will be provided electronically to the Baltimore District study manager. It is also assumed that the ITR team will be working virtually. Only under extreme circumstances should the ITR team, or a representative of that team, be required to physically attend team or milestone meetings. The ITR team should participate in all P milestone meetings via conference call or video teleconference.

8.0 REVIEW SCHEDULE

Development of a preliminary schedule for this environmental restoration study was accomplished during the reconnaissance phase. The preliminary milestone schedule reflected in the 2004 project management plan assumed that appropriate funding for the study was provided in subsequent fiscal years to effectively accomplish the study.

Note that since the commencement of this study preceded the requirement for PCX involvement and development of this review plan, the updated review schedule below differs from the major review process milestone list in section 6 above.

| <u>TASK</u> | <u>START DATE</u> | <u>FINISH DATE</u> |
|--|--|---------------------------|
| Develop review plan and post to website, PCX | 24 Apr 2007 | 29 June 2007 |
| Identify regional ITR resources and recommend ITR plan to PCX | 2 July 2007 | 20 July 2007 |
| PCX assigns/approves ITR team | 23 July 2007 | 24 Aug 2007 |
| ITR team review of feasibility scoping meeting documents | Waived (since study beyond this point) | |
| Feasibility scoping meeting | Waived (since study beyond this point) | |
| Review of models (by PCX/ITR) | TBD | |
| P-7 Meeting | 19 Jul 2007 | |
| Preparation for alt. formulation briefing (AFB) | TBD | |
| Alternative formulation briefing | TBD | |
| Review of draft feasibility report | Mar 2009 | Aug 2009 |
| Submit DE's public notice of study completion | Sept 2009 | |

9.0 PROJECT RISK

An initial project risk assessment was conducted by Baltimore District's study manager. Ultimately, the assessment of risk will be defined in coordination with the entire project team and the PCX. For this exercise, an assessment was made of the risk associated with this project based upon five factors and the project was rated quantitatively among five levels of project risk, ranging from low to high (risk score class). All five factors were weighted equally and are described further below. The rater considered previous District project experiences when making this analysis. No attempt was made to tie this risk to a national scale of rating; however, it is assumed that the PCX will bring this perspective to their assessment of the rating.

- Risk inherent in project complexity deals with the potential that the project will fail after it is ultimately constructed.
- Customer expectation risk is a measure of the level of expectation of the sponsor and the risk that we may not be able to meet them.
- The project schedule and cost were assessed a low degree of risk if they both remained flexible, and a high degree of risk if the project schedule and cost were to become fixed.

- Staff technical experience was assessed as a low degree of risk if the staff had a high level of ecosystem restoration experience, and a high degree of risk if the staff had minimal experience.
- The impact of project failure and the subsequent consequences are determined based on preliminary future, without project scenarios in conjunction with sponsor and technical team member input.

The score for the risk items were summed and the average value of the risk assessment scores was used to determine overall project risk level (Table 9.1). Based upon this analysis by the Corps study manager, the project is projected to carry low-to-medium level of risk with a score of 2.2. The results of the evaluation are tabulated as follows:

Table 9.1 Quality Control/Review Plan Score Guide

| Project Risk Item | Risk Assessment Score (Low Degree to High Degree) | | | Score |
|--|--|---------------|-------------|---|
| | Low | Medium | High | |
| Project Complexity | 1 2 | 3 4 | 5 | 2 |
| Customer Expectations | 1 2 | 3 4 | 5 | 4 |
| Product Schedule/Cost | 1 2 | 3 4 | 5 | 2 |
| Staff Technical Experience | 1 2 | 3 4 | 5 | 3 |
| Failure Impact and Consequences | 1 2 | 3 4 | 5 | 2 |
| Average Project Risk Assessment Score | | | ➔ | 2.2 Low-to Medium Risk |

10.0 REVIEW PLAN

The components of the review plan were developed pursuant to the requirements of EC 1105-2-408.

10.1 Team Information

The decision document that will be the ultimate focus of the peer review process is the integrated feasibility report, which will include an environmental assessment. The purpose of the decision document will be to begin the approval process leading to project authorization and project implementation.

The current project team is listed below. This list provides the points of contact of Baltimore District (NAB) team members that are available to answer specific technical questions as part of the review process. The list also provides the names and organizations of the non-federal sponsors and participating outside entities.

District Project Team Members

CENAB-PP-C
Project Manager

CENAB-EN-GH
Senior Hydraulic Engineer

CENAB-PL
Study Manager

CENAB-EN-WW
Hydraulic Engineer

CENAB-EN-WC
Design Manager

CENAB-EN-C
Cost Estimator

CENAB-EN-WE
Civil Engineer

CENAB-PL
Cultural Resource Specialist

CENAE-EP-VC
Regional Economist

CENAB-RE-C
Real Estate Specialist

Sponsor Team Members

Claudia Hamblin-Katnik, City of Alexandria, Watershed Coordinator
Craig D. Perl, Transportation and Environmental Department, City of Alexandria, Virginia
Aimee Vosper, City of Alexandria
Bill Skrabak, City of Alexandria

Bill Hicks
Northern Virginia Regional Commission
Senior Water Resource Planner

Jason Papacosma, Arlington County
Jeff Harn, Arlington County
Allen Rowley, Arlington County
Aileen Winkvist, Arlington County

Independent Technical Review (ITR) Team

Based on early project coordination with New England District (NAE), it is recommended to the PCX that NAE be the approved ITR selection. When the official ITR team is determined, the name, organization and discipline for the team members will be provided below:

Hydraulic Engineering
Civil Engineering
Real Estate
Ecology

Planning
Cost Estimating
Economics

10.2 Scientific Information

Based upon the self-evaluation by the project team, it is unlikely that the feasibility report will contain influential scientific information. The environmental restoration measures that were identified within the 905(b) analysis will be evaluated using standard engineering, environment, environmental, and economic processes, with pertinent engineering and economic models that have been developed and approved by Corps of Engineers for use in planning studies. These models include HEC-HMS and HEC-RAS.

The Corps' Hydraulic Engineering Center (HEC) was asked to provide technical assistance for the hydrologic and hydraulic effort, specifically a review of the flood frequency analysis and the method for adjusting non-homogenous flow data. Technical review comments have been provided to the project hydraulic engineer and coordinated with the non-federal sponsor.

Though not a model, extensive GIS analysis of the watershed was used as an assessment tool to optimize the selection of sites for restoration. Stream assessment surveys and geospatial data were incorporated with individual maps of six different criteria. Details of the formulation strategy will be presented in conjunction with the P-7 milestone meeting. The project team will determine with the ITR team whether or not this process is considered novel and requires certification.

The NVRC was tasked with developing a method for quantifying the benefits of reducing flood damages by reducing the amount of stormwater runoff. The NVRC has developed a watershed model for stormwater management purposes. In addition to the model, a variety of studies and products related to improving water quality and restoring flood damages have been underway, such as: a regional best management practices study, non-point source planning and outreach, TMDL (total maximum daily load) studies and an implementation plan.

Based on the data collection, analysis, and identification of opportunities by the project team, the non-federal work groups are working jointly during the feasibility phase to develop project recommendations. Work on the levee in-channel designs, urban corridor designs, and watershed restoration plan are being done concurrently for input into the final feasibility report.

10.3 Timing

The ITR process is envisioned to begin in summer 2007 with an assessment of the engineering (hydrologic/hydraulic) models, virtual participation in the P-7 meeting, and the engineering methods to be used in the evaluation and comparison of alternative plans in this feasibility study. It is anticipated that work would start within one week of assigning the ITR team. The estimated schedule is noted in section 8 of this review plan.

10.4 External Peer Review Process

No external peer review (EPR) is deemed necessary at this time, though this assumption will be confirmed with the PCX. According to requirements set forth in EC 1105-2-408, the feasibility

study will not present novel methods or models, present complex interpretations, have conclusions that change prevailing practices, impact public safety or affect significant policy decisions. This assessment is supported by the evaluation of the project team in June 2007 in section 5 and tabulated as shown in section 9 of this review plan.

10.5 Public Comment

Public involvement has continued throughout the feasibility study since its inception in 2004 for a variety of audiences, such as the (provide list here) and the public at large. The Four Mile Run Agency Coordination Group, consisting of members of the Baltimore District, Northern Virginia Regional Commission, Arlington County and the City of Alexandria guide the overall study and helped to establish sub-work groups to address specific technical and focus areas of the study. One of the subgroups formed was the Joint Task Force which provides direct input from local citizens. In addition, Arlington County and the City of Alexandria have formed an ad hoc committee to coordinate community involvement.

The public outreach plan is extensive and there are several components planned during this study to include:

- Newsletters – to be issued during the initiation and recommended plan phase of the feasibility study,
- Workshops, community meetings – at least three public workshops will be held. The purpose of the first public workshop will be to scope public interest and gather ideas about potential projects. The purpose of the intermediate workshops will be to provide information and gather public comments after several alternatives have been developed.
- Citizen Task Force – formed as part of the community outreach plan. The Citizen Task Force will consist of multiple representatives from Arlington County and the City of Alexandria.
- Website, fact sheets and public outreach documents - The NVRC will be responsible for setting up and maintaining a website to inform the public of the planning process. In addition, the Planning Division will investigate the possibility of setting up an intranet service for sharing information among the study team members. Fact sheets and information papers will be prepared on an as-needed basis from each agency represented on the study team.
- Congressional briefings - Briefings requested by members of congress will primarily be the responsibility of the Baltimore District.
- Advisory Commission - The non-Federal sponsors have formed a task force consisting of various local government and citizen representatives from Alexandria and Arlington. The purpose of the task force is get input into the levee corridor environmental, recreational, and aesthetic improvements. The non-Federal partners will hire NVRC and a consultant to assist with this process. It is anticipated that this task force will meet bi-monthly throughout the study process. All Agency Coordination team members will attend these meetings to ensure consistency throughout the feasibility study.
- Public Meetings - a public meeting will be held after the release of the draft feasibility report with integrated Environmental Assessment to present, discuss, and receive comments on the recommended plan. Future public meeting dates

have not been scheduled at this time but are anticipated after major milestones are met.

10.6 ITR Reviewers

It is anticipated that six to seven reviewers should be available in the following disciplines: hydraulic engineering, civil engineering, real estate, ecology, economics, cost estimating, and planning. Section 10.1 of this review plan will be updated to reflect specific reviewer contact information once the ITR team is assigned by the PCX.

The expertise that should be brought to the ITR team includes the following:

- 1) Hydraulic Engineering – The reviewer should have extensive knowledge of principles of fluid geomorphology and natural stream channel design. The reviewer should also have a solid understanding of surface water hydrology, hydraulic modeling, erosion, sediment transport and bank protection measures.
- 2) Civil Engineering – The reviewer should have knowledge of site development principles, storm water drainage, as well as surveying and mapping using AutoCAD Land Development desktop and HEC-RAS interpretation and mapping software. The reviewer should also have experience with existing flood protection measures, such as levees, floodwalls and gabions.
- 3) Real Estate – The reviewer should have knowledge of land acquisition process, permit review and land appraisal.
- 4) Ecology – The reviewer should have a solid background in the restoration of freshwater wetlands and upland habitats, and understand the factors that influence the reestablishment of native species of plants and animals.
- 5) Planning – The reviewer should have recent experience in reviewing plan formulation processes for multi-objective studies and be able to draw on “lessons learned” in advising the project team of best practices.
- 6) Cost Estimating – The reviewer should have recent experience in concept-level estimating for stream restoration and storm water retrofit projects. It is anticipated that the M-CACES cost estimate will be reviewed by the USACE center of expertise in Walla Walla District.
- 7) Economics – The reviewer should have a solid understanding of economic models including cost-effective incremental cost analysis (e.g. IWR Plan suite) and their application to ecological restoration and public perception of risk.

10.7 External Peer Review Selection

There is no external peer review (EPR) selection because EPR is not anticipated for this study. Should it be determined that EPR is required, and selection process will be crafted and presented in an update to this document.